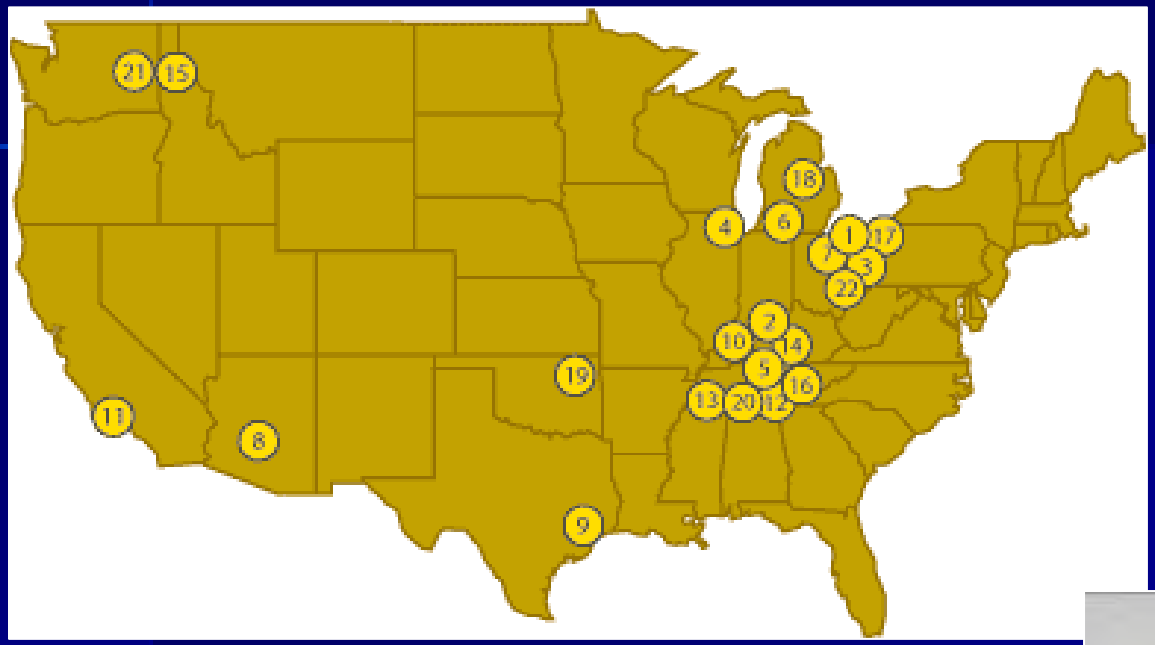
Paul's Picks #4: Subsurface Reaction / Fire (aluminum waste)

East Sparta, Ohio
2007 - ????

Background

- Received 600k tons AL dross from removal (mid 90's)
- Re-circulate leachate ('03)
- Elevated temps, odors, slope failure, gas & leachate anomalies ('06)
- OEPA Orders (3 sets - '06-'07)
  - USEPA technical assistance ('06-present)
  - Request SF assistance (late '07)
- Settlement Agreement ('08)

Aluminum Dross



a.k.a.

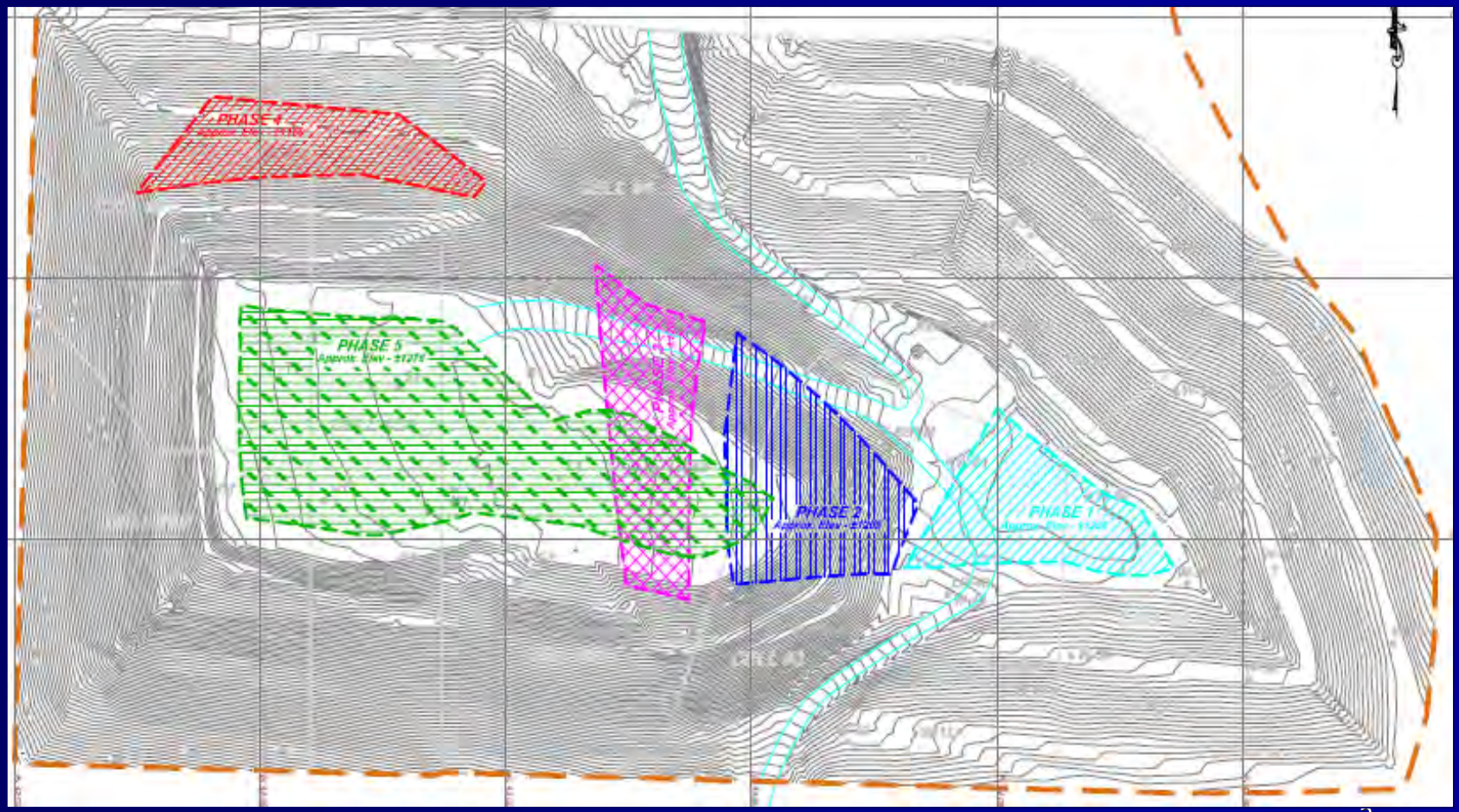
salt cake, black or white dross

AERIAL VIEW

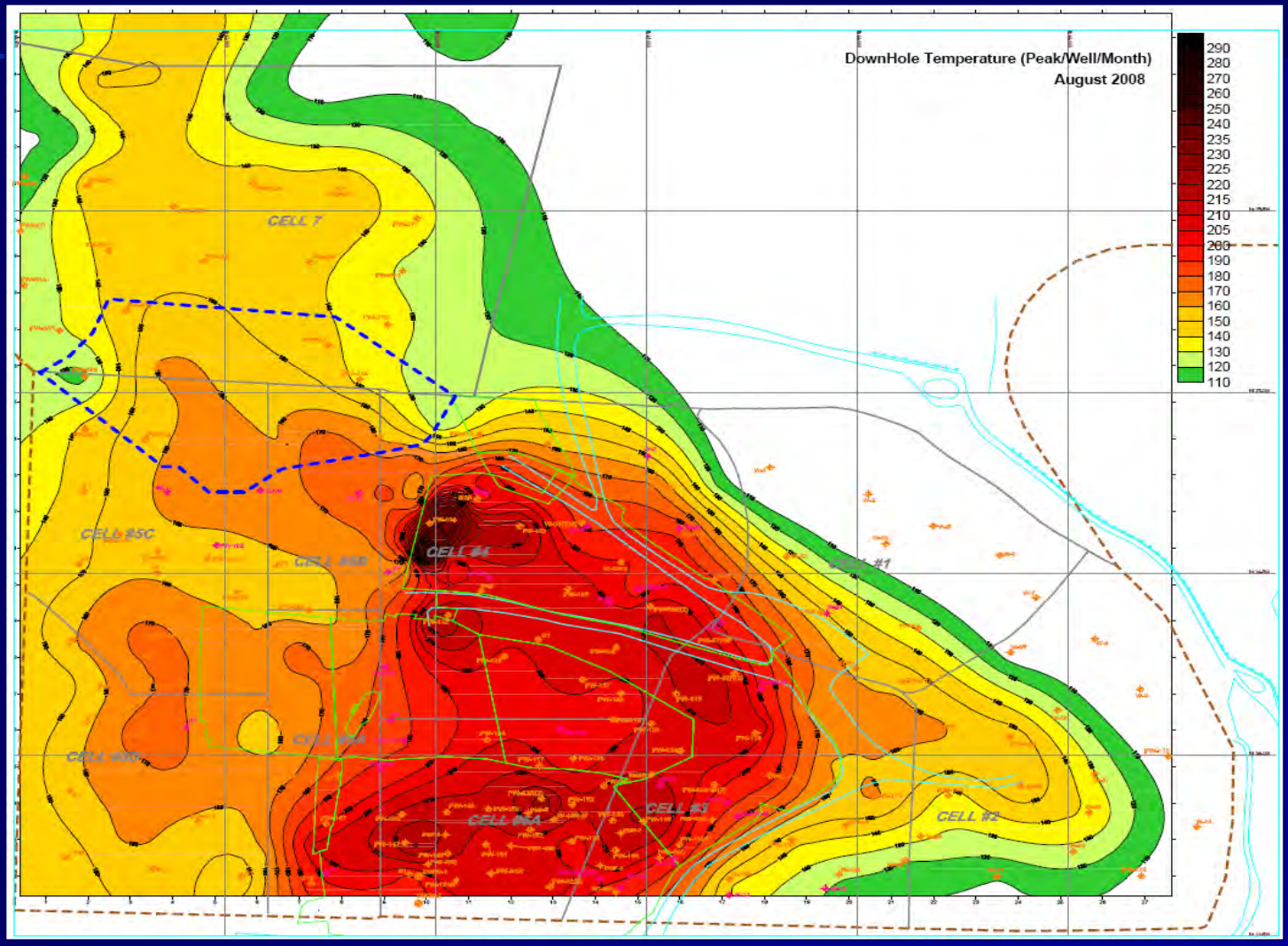
N

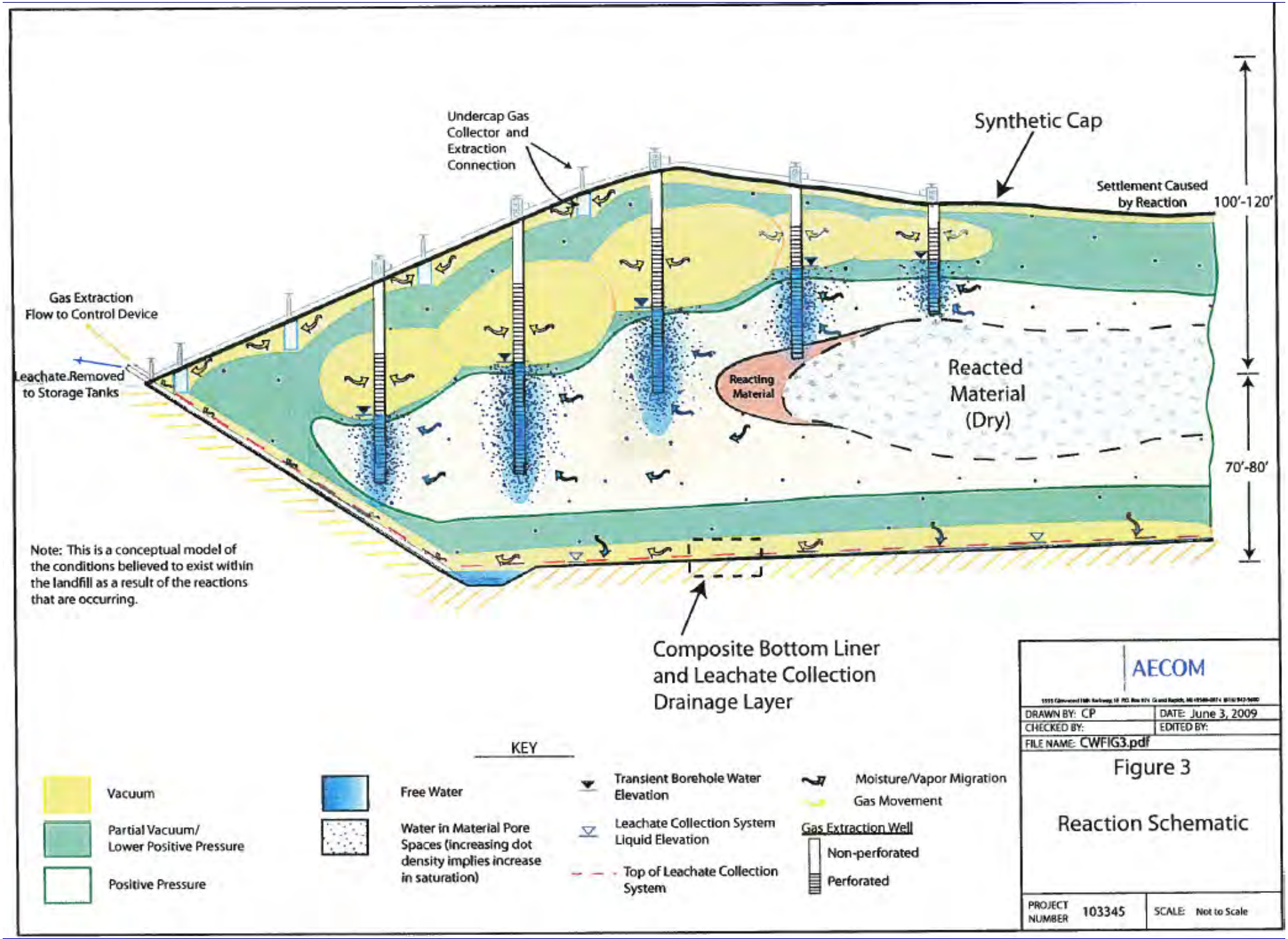
4

Aluminum Dross + Leachate Recirculation = ???



Temperatures




Undercap Gas Collector and Extraction Connection
Synthetic Cap
Settlement Caused by Reaction
100'-120'
Gas Extraction Flow to Control Device
Leachate Removed to Storage Tanks
Reacting Material
Reacted Material (Dry)
70'-80'
Note: This is a conceptual model of the conditions believed to exist within the landfill as a result of the reactions that are occurring.
Composite Bottom Liner and Leachate Collection Drainage Layer
KEY
Vacuum
Partial Vacuum/ Lower Positive Pressure
Positive Pressure
Free Water
Water in Material Pore Spaces (increasing dot density implies increase in saturation)
Transient Borehole Water Elevation
Leachate Collection System Liquid Elevation
Top of Leachate Collection System
Moisture/Vapor Migration
Gas Movement
Gas Extraction Well
Non-perforated
Perforated
AECOM
DRAWN BY: CP
DATE: June 3, 2009
CHECKED BY:
EDITED BY:
FILE NAME: CWFIG3.pdf
Figure 3
Reaction Schematic
PROJECT NUMBER 103345
SCALE: Not to Scale

Subsurface Heat & Pressure

Subsidence & Cracking

9

RESPONSE STRATEGY =
Isolate & Contain reaction/fire

- Control escape of gas, odor & liquid
- Reduce infiltration of O_2 & H_2O
- Stabilize reaction area

“The Bowl” - BEFORE

“The Bowl” - AFTER

Current Temporary Cap

Sub-cap drains &
gas collectors

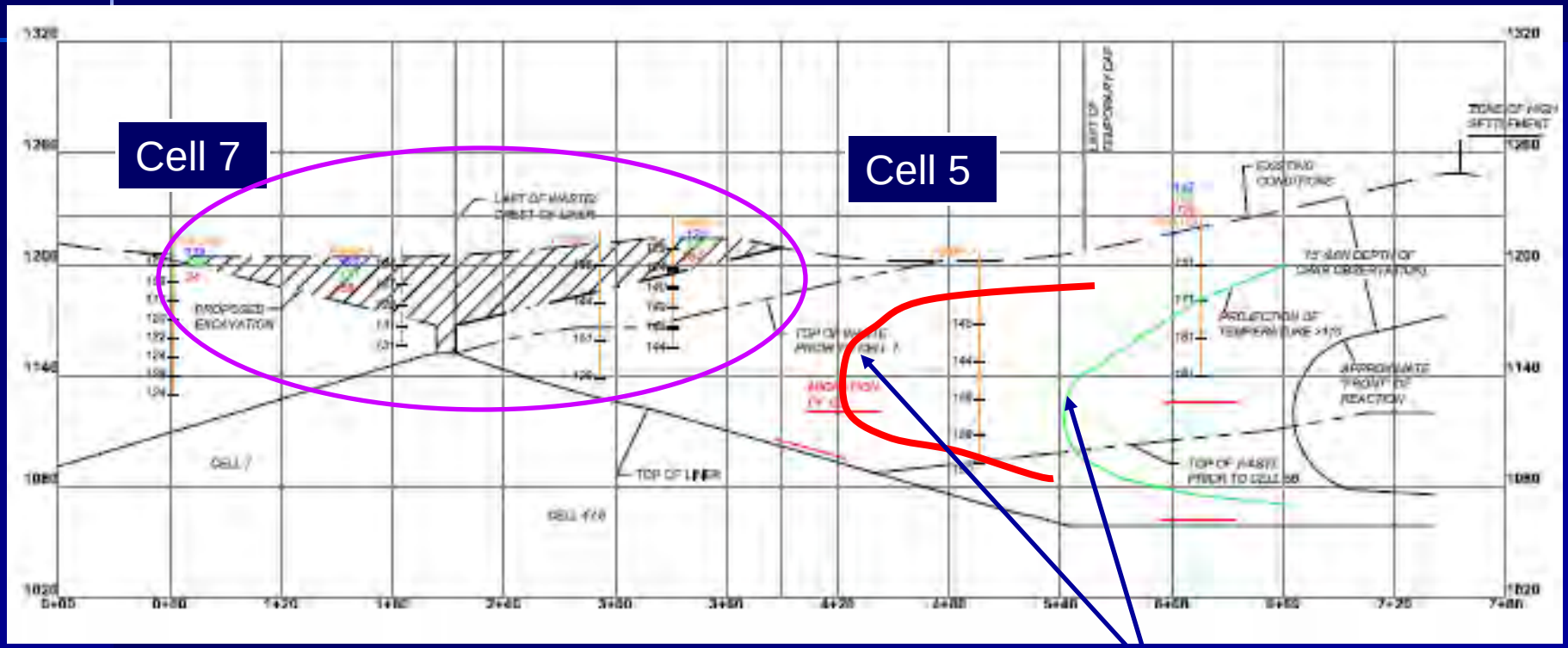
15

Increased leachate storage capacity

Increased flaring capacity

Increased SW run-off capacity

Isolation Break



Projection of heat, gases and settlement from dross reaction/fire

Isolation Break

- Two excavators
- 8 layers, ~10’ each
- Disposed in adjacent Cell
- ~ 45 “working days”
- 5 months of odors
- 10,000+ yds moved in a good day
- ~ $6 million
  - + $7m in improvements to gas, leachate header systems

Waste monitoring

Large excavators

Personnel monitoring

Baghouse Dust

All aluminum wastes were disposed of in the 88 acre remediation area

Onsite Network

U.S. EPA

4 perimeter

1 portable

On-Site Air Monitors

- Continuous, real-time monitors installed
  - VOC readings every 20 sec
    - Triggered 15 min SUMMA if total VOCs >500ppb for > 5min
  - On-site, web computer tracking
  - Met data at each station
- Discontinued 8/09

Life at the bottom

Life at the bottom

Life at the Bottom

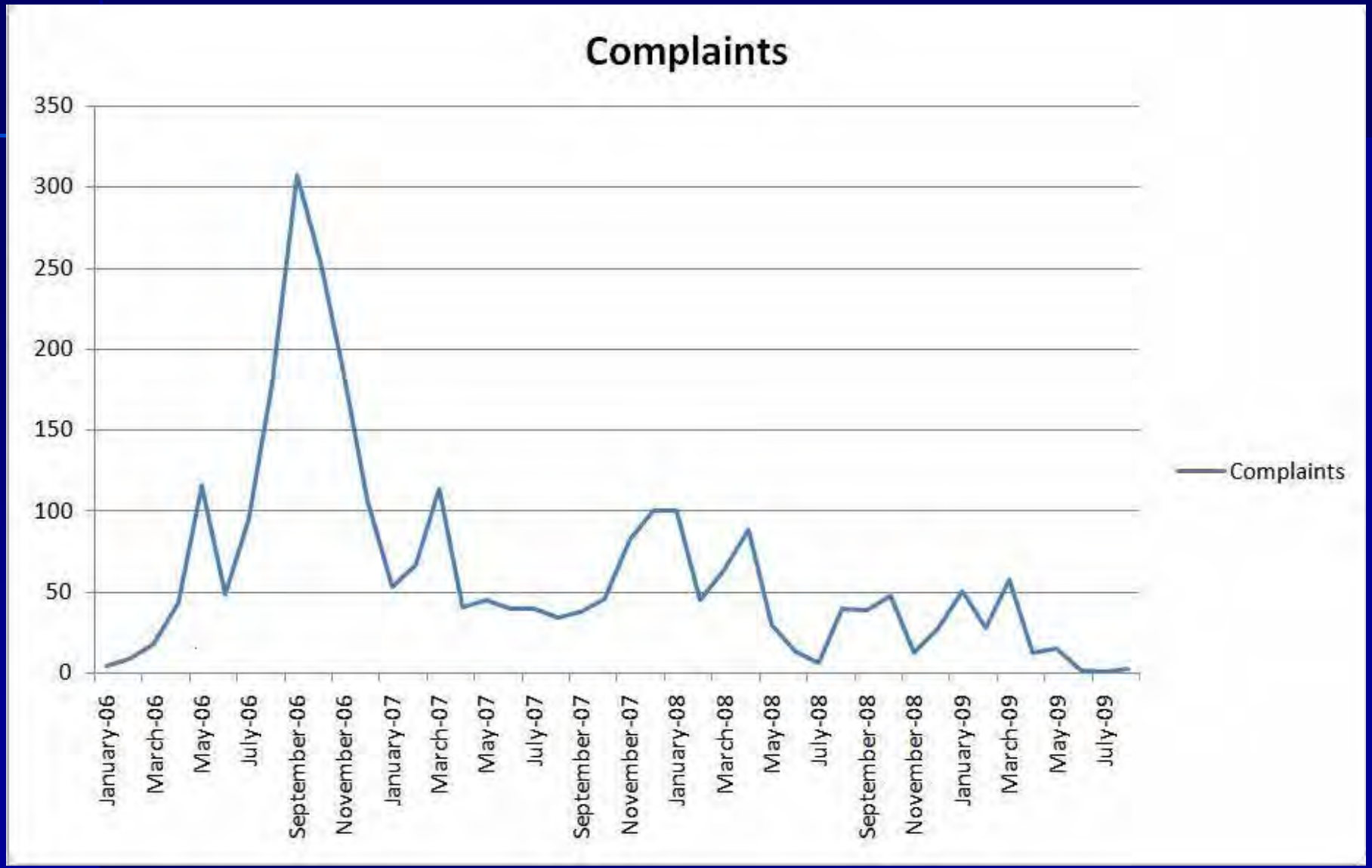
Isolation Break

Isolation Break

Isolation Break

Isolation Break

Odors


Complaints
350
300
250
200
150
100
50
0
January-06
March-06
May-06
July-06
September-06
November-06
January-07
March-07
May-07
July-07
September-07
November-07
January-08
March-08
May-08
July-08
September-08
November-08
January-09
March-09
May-09
July-09
Complaints

NOW WHAT ???

O & M Plan

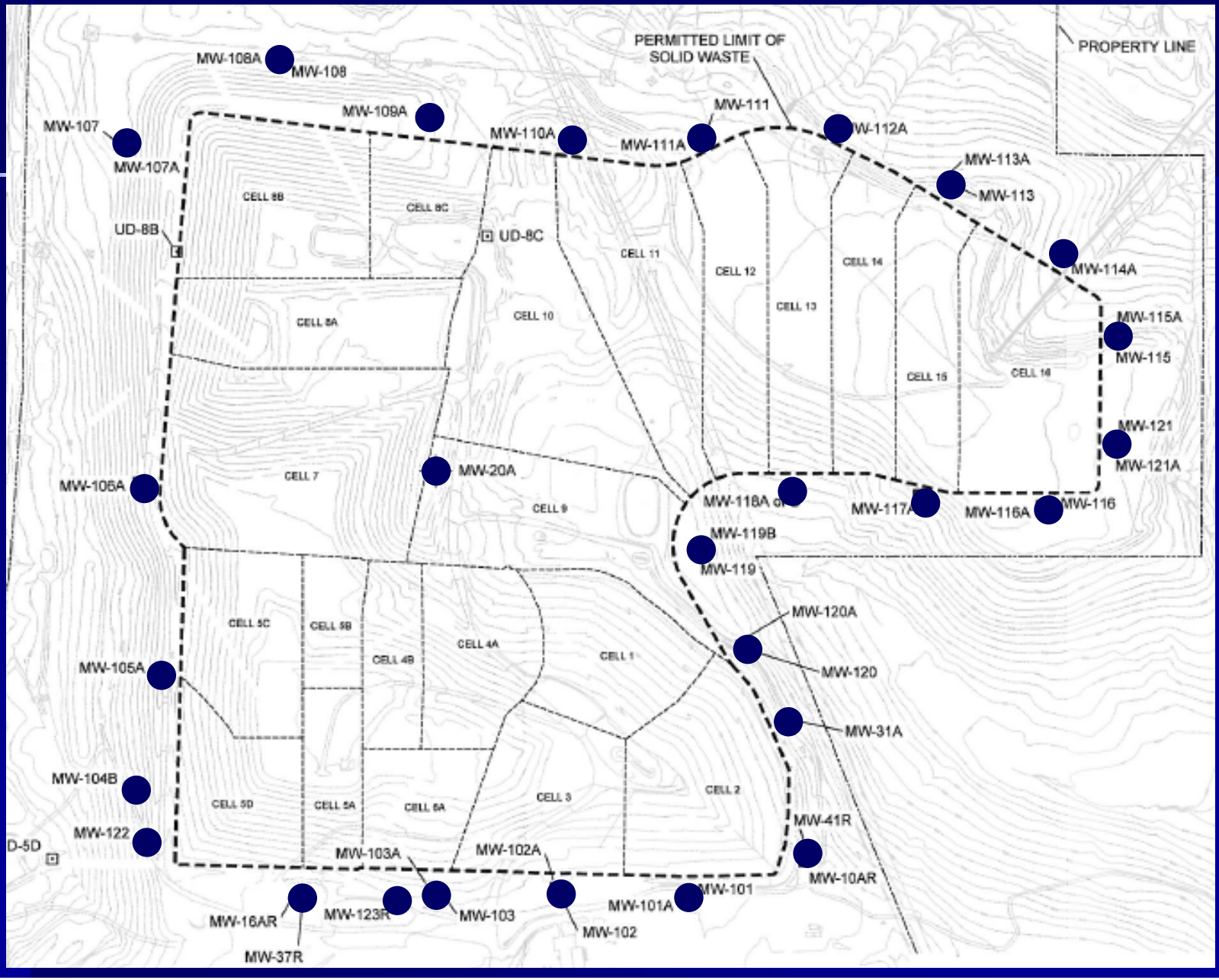
1) Maintain engineered components which control gas, condensate, leachate, pressure & oxygen/water intrusion

2) Prevent release of odors, gases & leachate

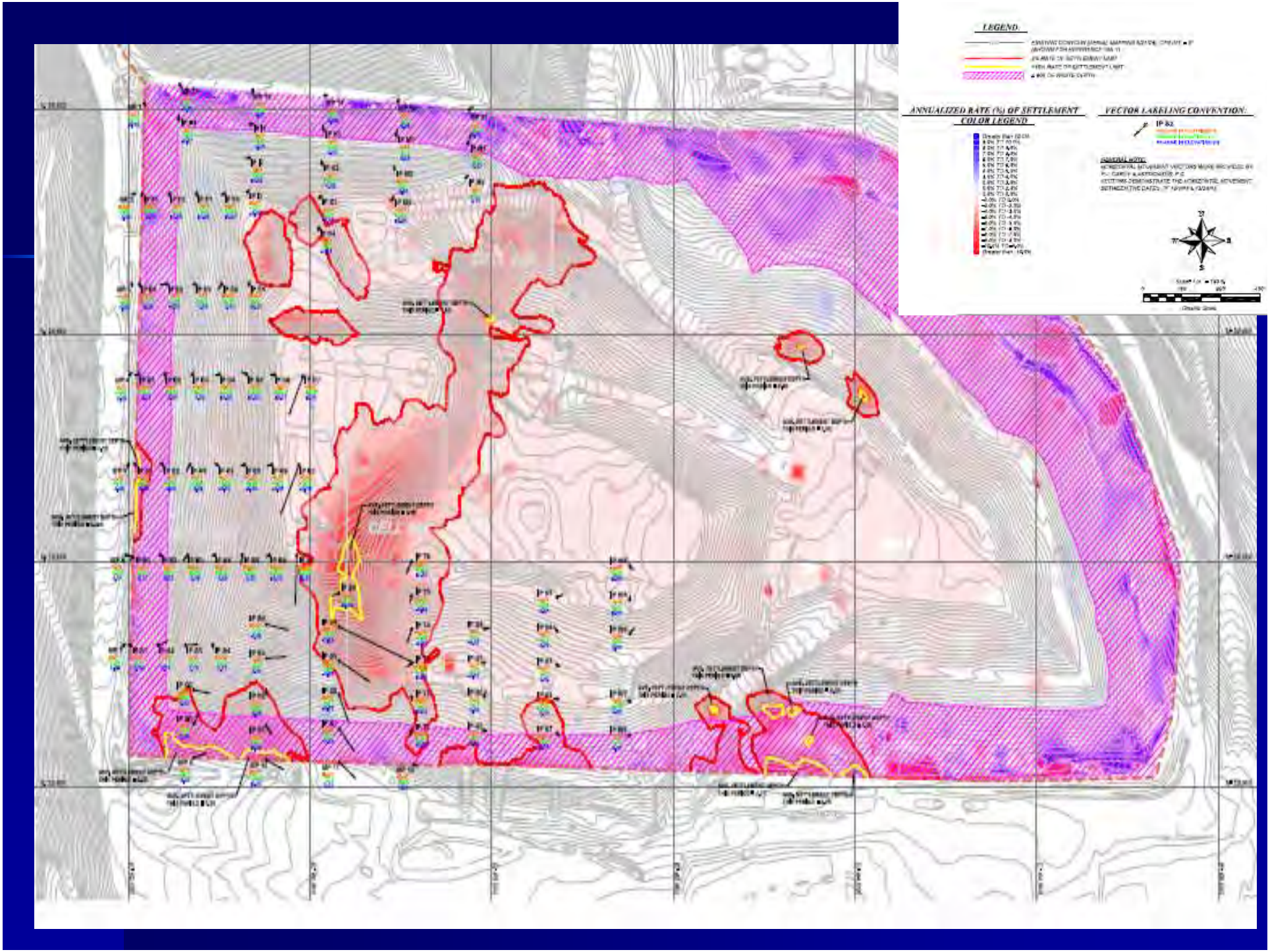
3) Maintain slope stability and containment until the reaction runs its course

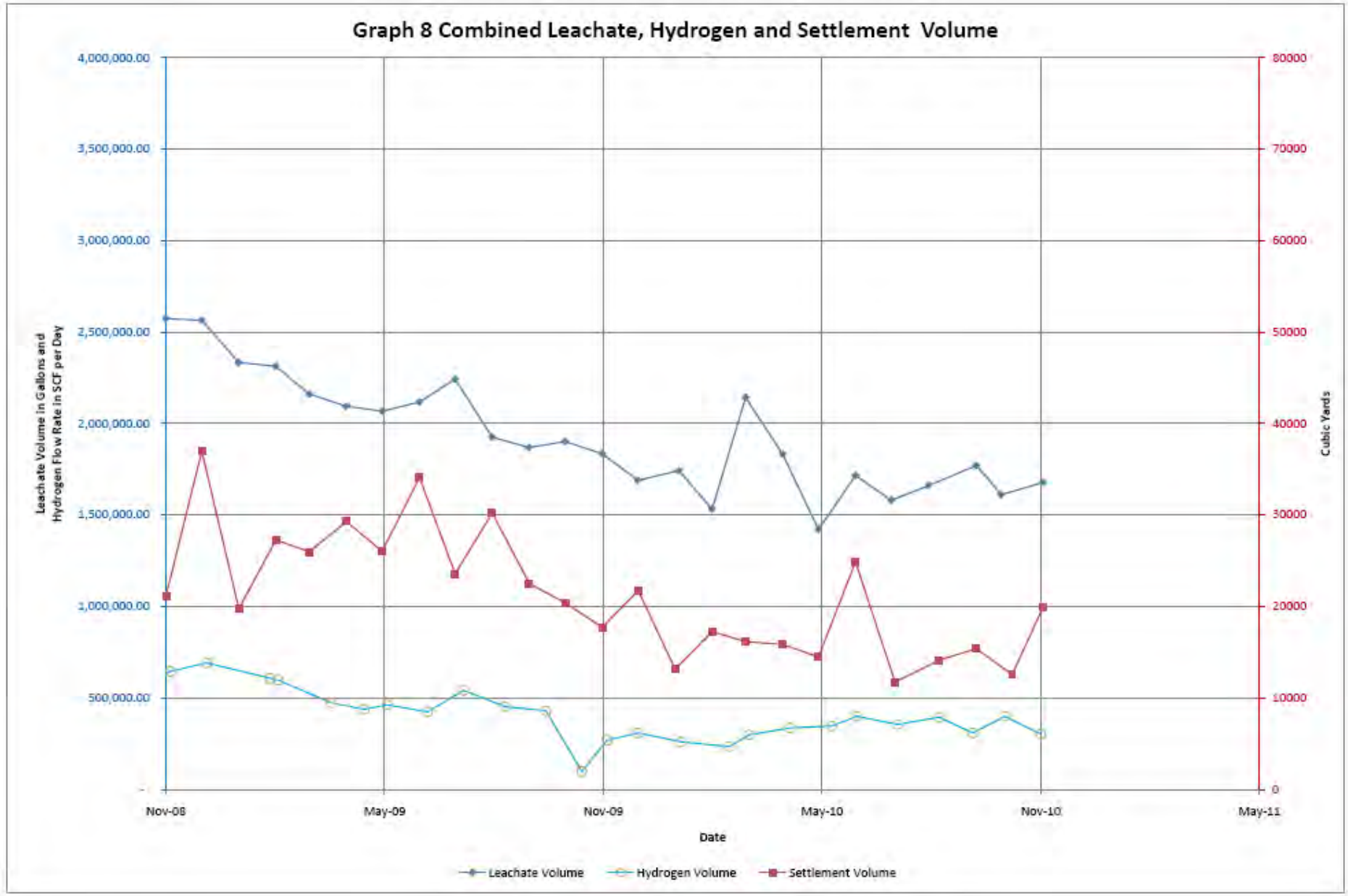
4) Final closure & post-closure monitoring of remediation area

Groundwater Monitoring

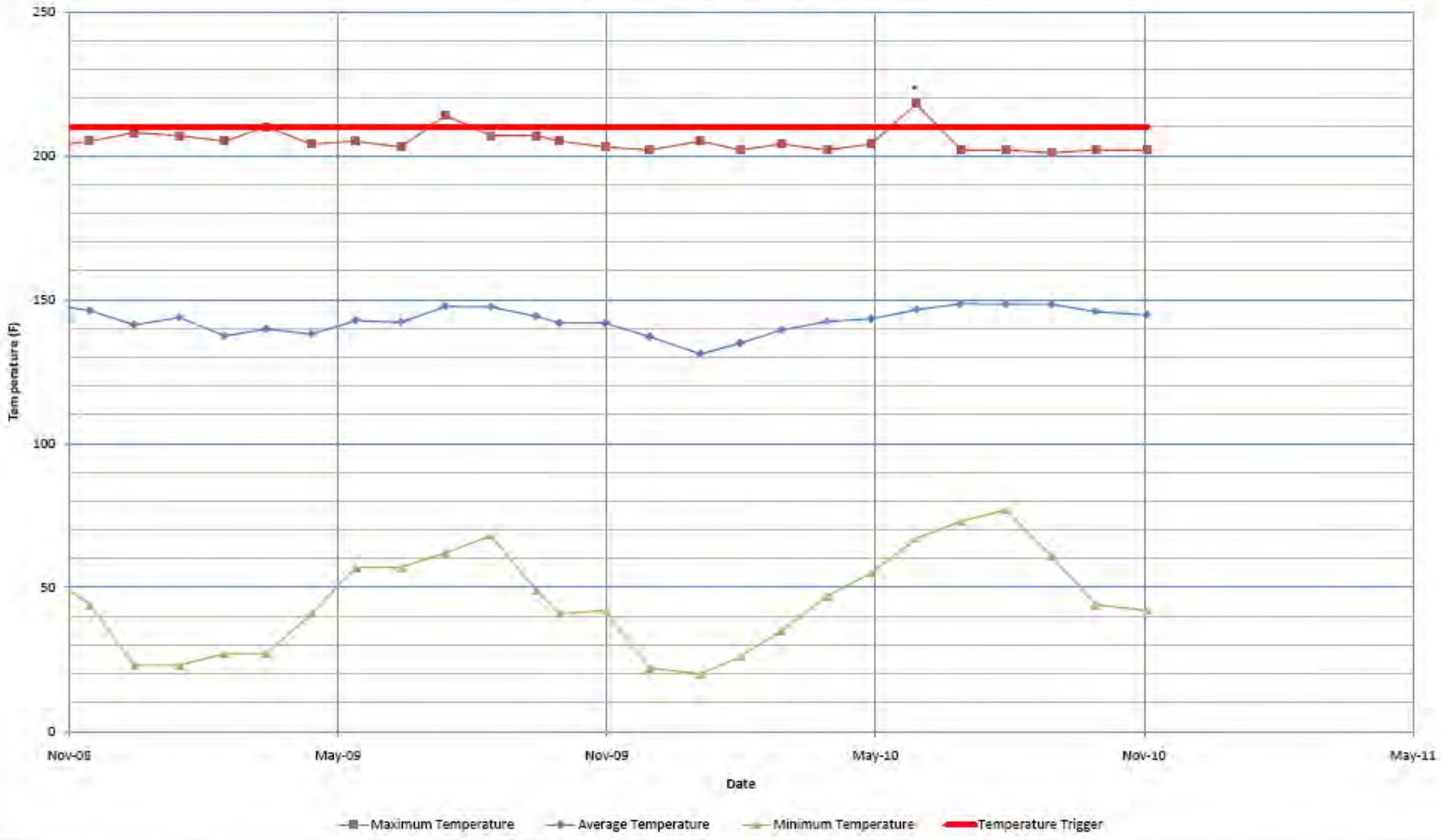


33

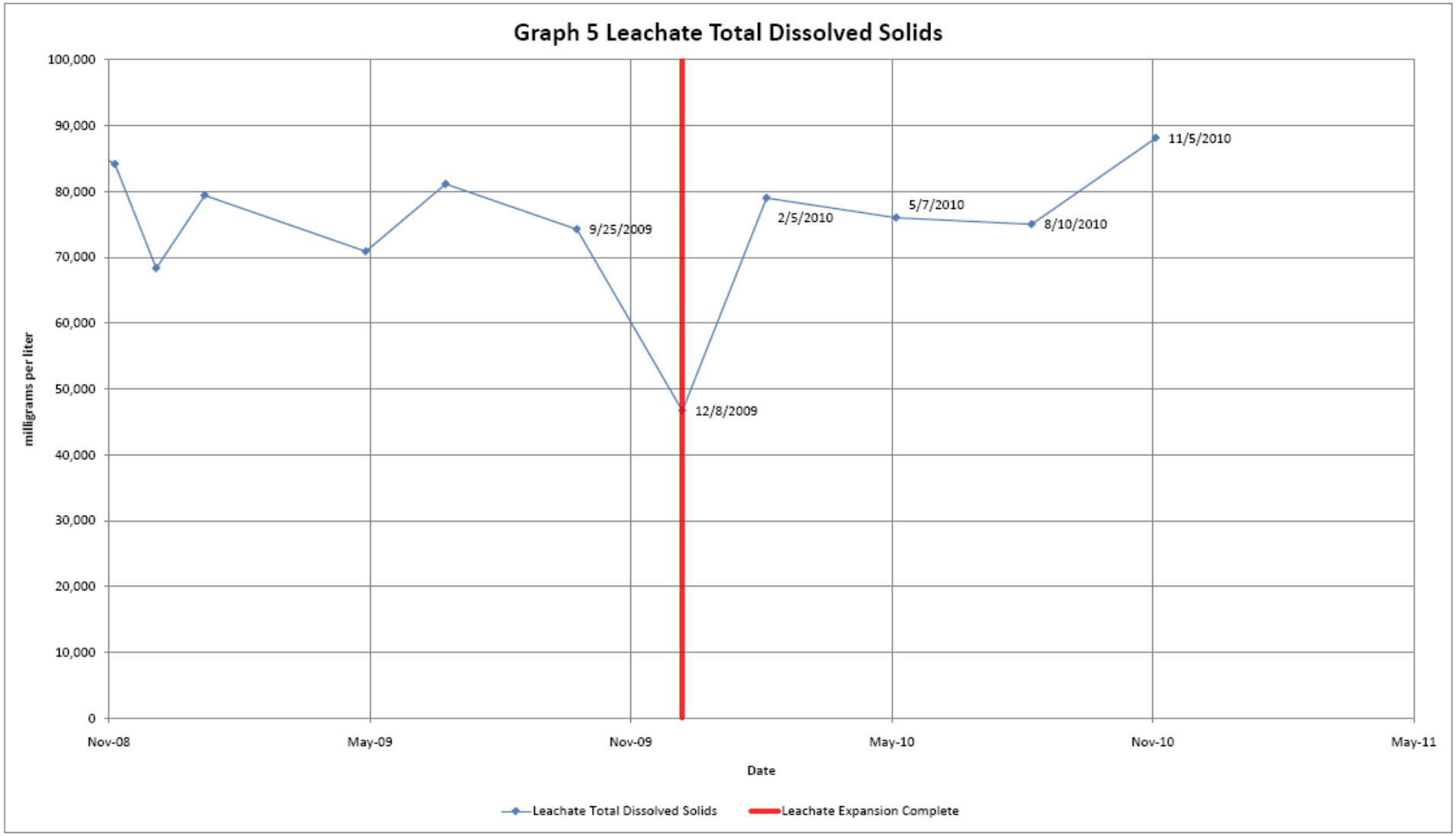

LEGEND:
ANNUALIZED RATE (%) OF SETTLEMENT
COLOR LEGEND
VECTOR LABELING CONVENTION:
IP 82
GENERAL NOTE:


Graph 8 Combined Leachate, Hydrogen and Settlement Volume
Leachate Volume in Gallons and Hydrogen Flow Rate in SCF per Day
Cubic Yards
4,000,000.00
3,500,000.00
3,000,000.00
2,500,000.00
2,000,000.00
1,500,000.00
1,000,000.00
500,000.00
-
80000
70000
60000
50000
40000
30000
20000
10000
0
Nov-08
May-09
Nov-09
May-10
Nov-10
May-11
Date
Leachate Volume
Hydrogen Volume
Settlement Volume

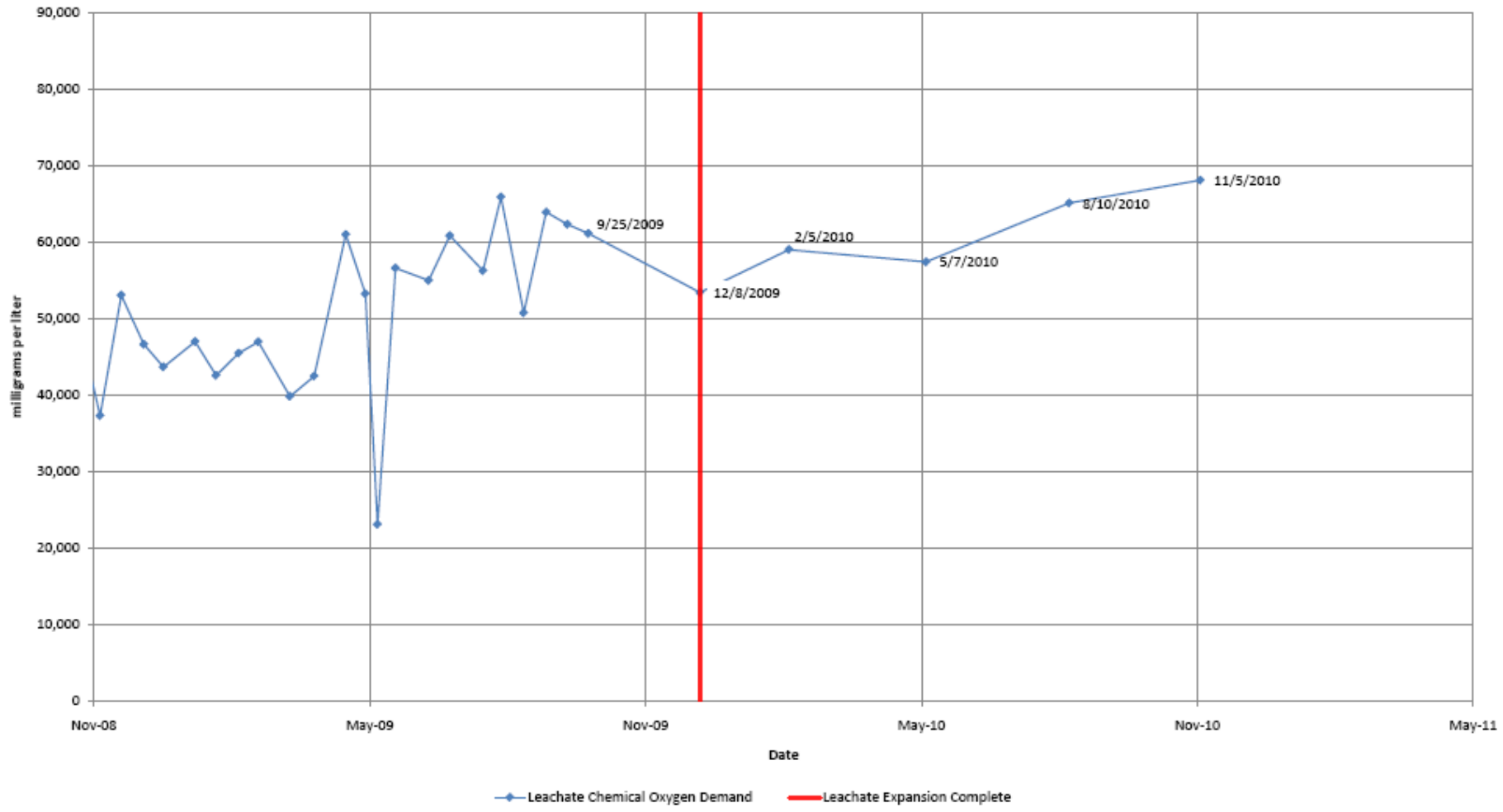
Graph 1 Wellhead Temperature



1. Maximum temperature depicted for June 2010 represents a single occurrence of a wellhead temperature over 210 degrees at a single well, caused by wellhead pressure. It does not represent a sustained temperature. Upon vacuum adjustment at the well, temperature returned to normal trend, below 210 degrees

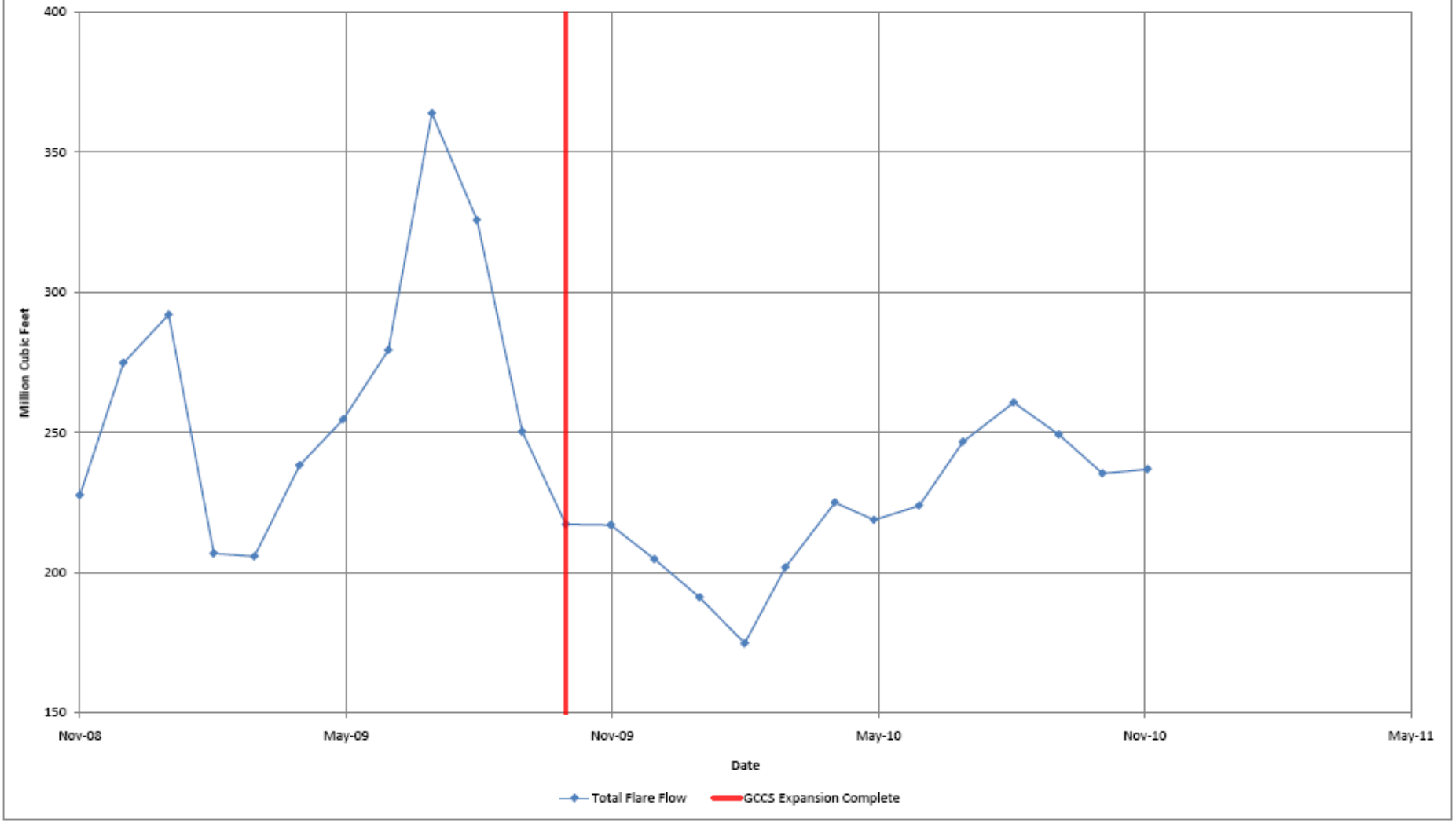

Graph 5 Leachate Total Dissolved Solids
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
milligrams per liter
Nov-08
May-09
Nov-09
May-10
Nov-10
May-11
Date
9/25/2009
12/8/2009
2/5/2010
5/7/2010
8/10/2010
11/5/2010
Leachate Total Dissolved Solids
Leachate Expansion Complete

Graph 6 Leachate Chemical Oxygen Demand

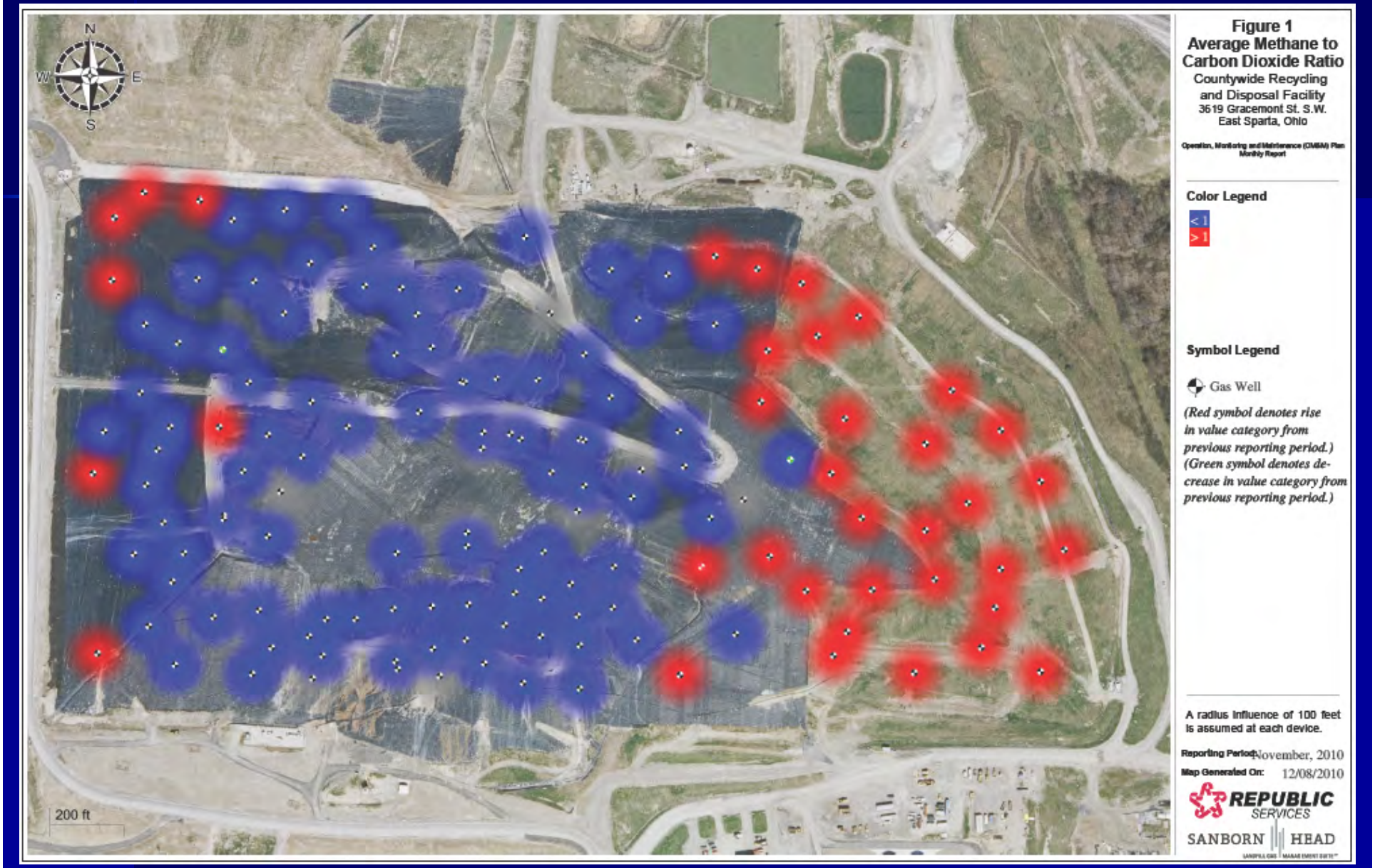


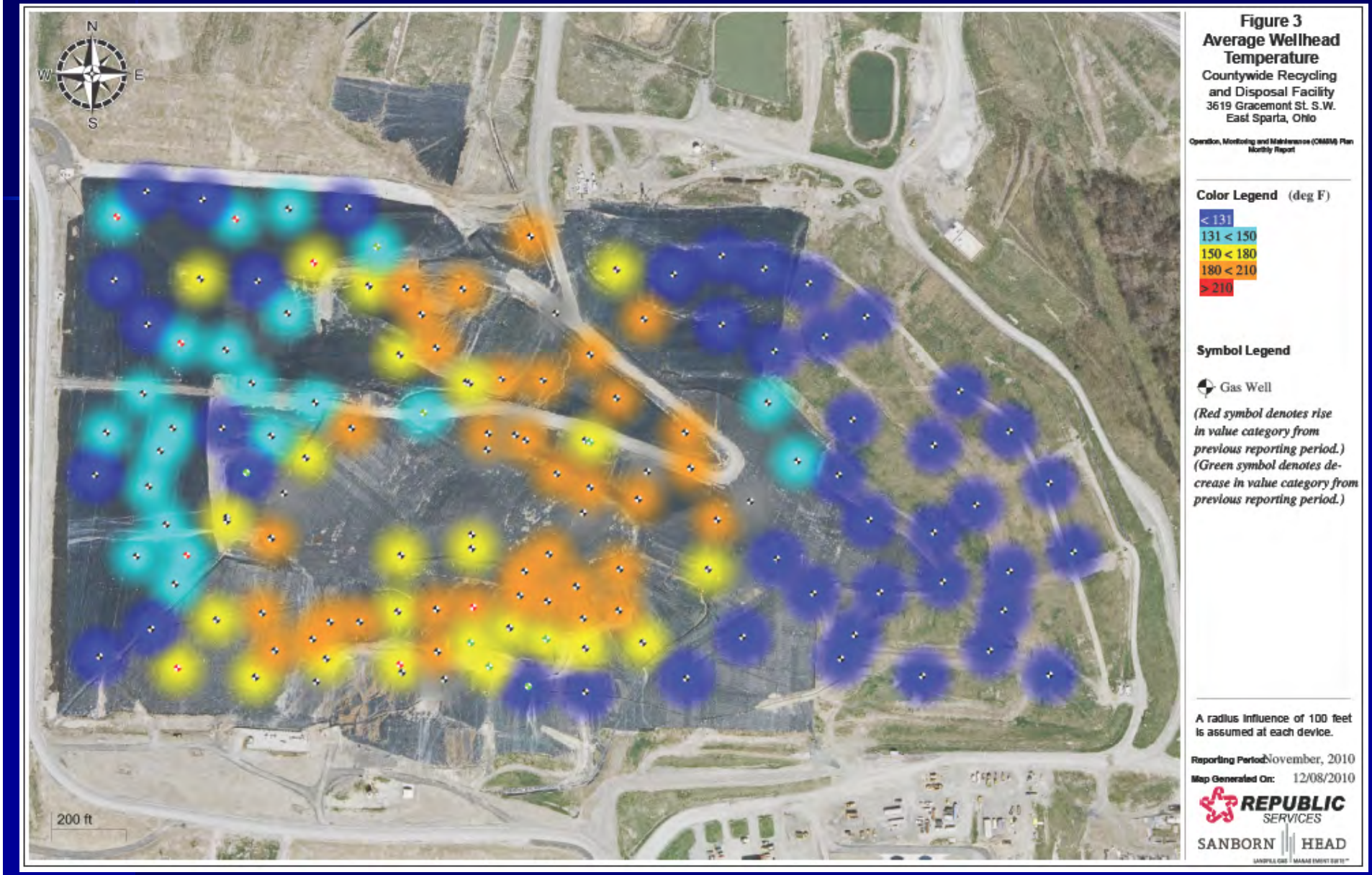
1. Information presented prior to October 2009 was compiled from data prepared and presented by AECOM for Countywide Recycling and Disposal Facility.
2. Data shown prior to October 2009 are flow-weighted averages of data from the East, North and South leachate collection tanks. Data from December 2009 is from combined Tank East 500.
3. Data shown prior to October 2009 comprises data from the leachate collection system only, and excludes certain leachate toe drains, sumps and gas collection wells.
4. Data labels beginning in October 2009 indicate date of quarterly analytical sampling.

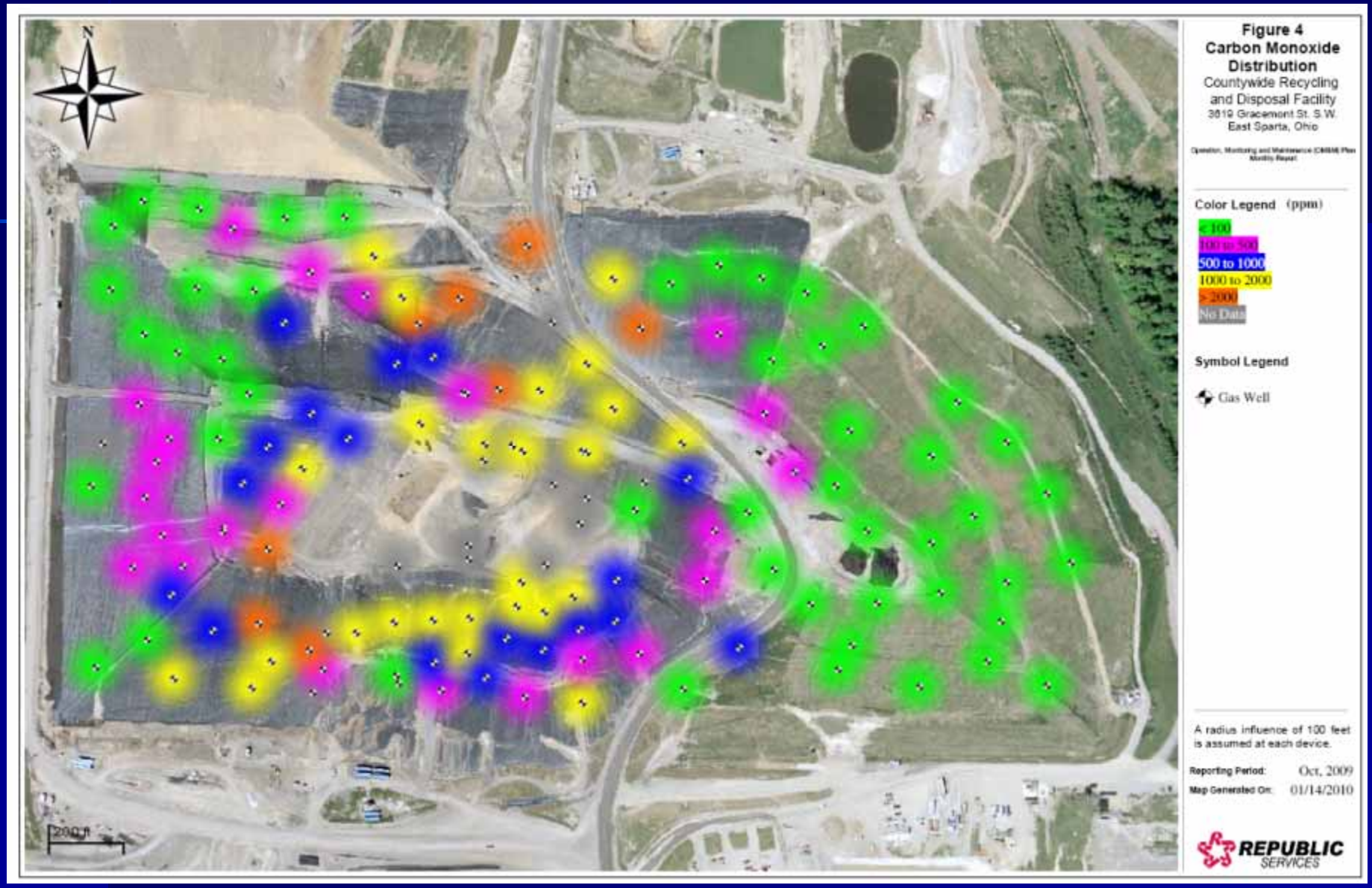
Graph 7 Total Flare Flow

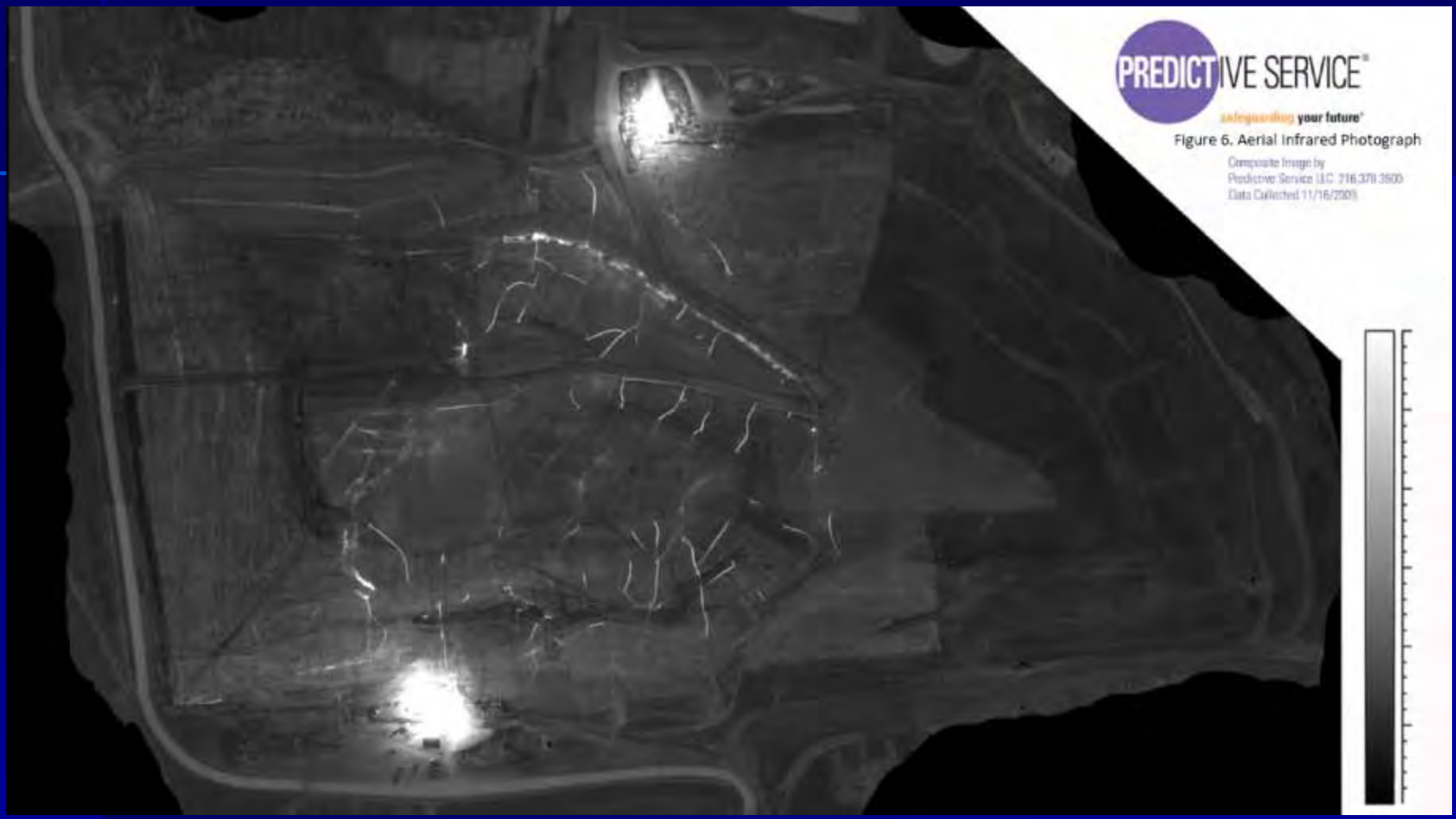


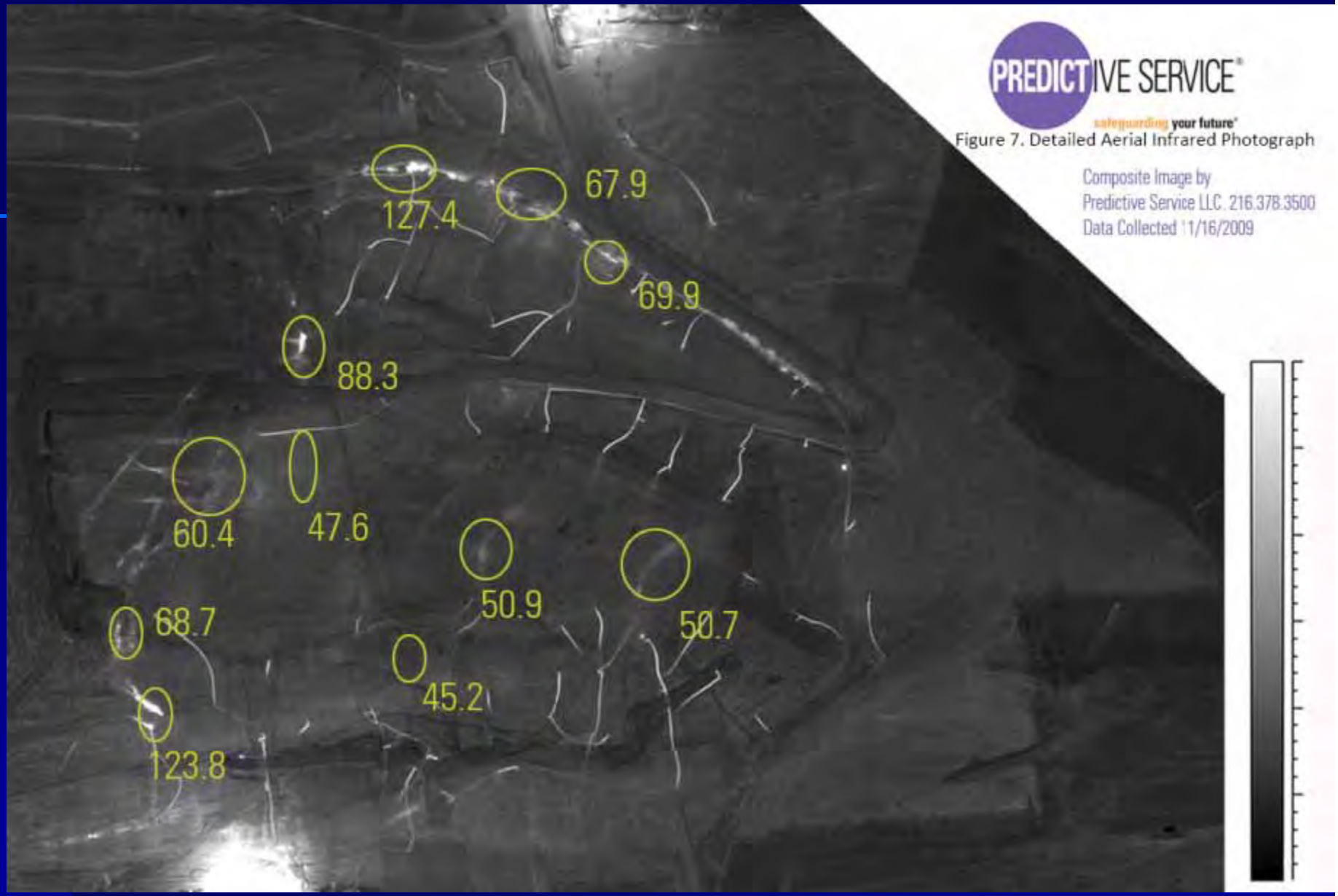
1. Increased flare flow in August 2010 is at least partially due to recalibration of flow meters during the reporting period.


N
W
E
S
200 ft
Figure 1
Average Methane to Carbon Dioxide Ratio
Countywide Recycling and Disposal Facility
3619 Gracemont St. S.W.
East Sparta, Ohio
Operation, Monitoring and Maintenance (OM&M) Plan Monthly Report
Color Legend
< 1
> 1
Symbol Legend
Gas Well
(Red symbol denotes rise in value category from previous reporting period.)
(Green symbol denotes decrease in value category from previous reporting period.)
A radius influence of 100 feet is assumed at each device.
Reporting Period: November, 2010
Map Generated On: 12/08/2010
REPUBLIC SERVICES
SANBORN HEAD


N
W
E
S
200 ft
Figure 3
Average Wellhead Temperature
Countywide Recycling and Disposal Facility
3619 Gracemont St. S.W.
East Sparta, Ohio
Operation, Monitoring and Maintenance (OM&M) Plan Monthly Report
Color Legend (deg F)
< 131
131 < 150
150 < 180
180 < 210
> 210
Symbol Legend
Gas Well
(Red symbol denotes rise in value category from previous reporting period.)
(Green symbol denotes decrease in value category from previous reporting period.)
A radius influence of 100 feet is assumed at each device.
Reporting Period: November, 2010
Map Generated On: 12/08/2010
REPUBLIC SERVICES
SANBORN HEAD


N
200 ft
Figure 4
Carbon Monoxide Distribution
Countywide Recycling and Disposal Facility
3619 Gracemont St. S.W.
East Sparta, Ohio
Operation, Monitoring and Maintenance (OMM) Plan Monthly Report
Color Legend (ppm)
< 100
100 to 500
500 to 1000
1000 to 2000
> 2000
No Data
Symbol Legend
Gas Well
A radius influence of 100 feet is assumed at each device.
Reporting Period: Oct, 2009
Map Generated On: 01/14/2010
REPUBLIC SERVICES


PREDICTIVE SERVICE
your future
Figure 6. Aerial Infrared Photograph


PREDICTIVE SERVICE
safeguarding your future
Figure 7. Detailed Aerial Infrared Photograph
Composite Image by
Predictive Service LLC. 216.378.3500
Data Collected 11/16/2009
127.4
67.9
69.9
88.3
60.4
47.6
50.9
50.7
68.7
45.2
123.8